

University of Washington Research with SeaKleen®

Russell P. Herwig and Jeffery R. Cordell
School of Aquatic and Fishery Sciences, Box 355020
University of Washington
Seattle, WA 98195-5020
16 January 2004

The University of Washington (UW) is involved with the evaluation and development of several ballast water treatment technologies. Research is being performed at different scales, from the laboratory bench to full-scale demonstration projects aboard working commercial vessels. Research personnel and their areas of expertise include Russ Herwig (Principal Investigator; microbiology), Jeff Cordell (Co-Principal Investigator, zooplankton), Jaime Grocock (Research Scientist, microbiology and phytoplankton), Nissa Ferm (Research Scientist, zooplankton), and Jake Perrins (Research Scientist, microbiology and aquatic chemistry). The UW began performing experiments with SeaKleen® in December 2003. Before beginning research with SeaKleen®, the UW performed mesocosm and shipboard treatment experiments with ozone, and mesocosm experiments with ultraviolet light.

Mesocosm experiments are performed at the United State Geological Survey Marine Field Station at Marrowstone Island, Washington. The station is located on the west side of northern Puget Sound. An individual mesocosm consists of a 75-gallon (280-liter) circular aquarium. Experiments are typically performed using four replicate mesocosms per treatment or control. This experimental design permits for statistical analysis of the data. Seawater is obtained from Puget Sound from an approximately 60-foot depth. The “raw” seawater is amended with mesoplankton that are collected by performing a tow in a bay near the station with a plankton net having a 110- μm mesh net. The seawater is amended with mesoplankton so that when a sample is collected from a mesocosm there is sufficient numbers of zooplankton for an evaluation of the treatment. During an experiment, treated and control mesocosms are periodically sampled for culturable bacteria, zooplankton, chlorophyll *a*, water chemistry, and other characteristics. The mesocosms are covered so the treated seawater is in the dark. In December 2003, the UW performed their first set of mesocosm experiments with SeaKleen®. The biocide was added to sets of mesocosms at either 1 or 2 parts per million (equivalent to 1 and 2 milligrams per liter). At these concentrations of SeaKleen® the number of living zooplankton was greatly reduced within 5 hours. The results were similar at 24 and 48 hours following the start of the experiment. At 48 hours, the contents of the mesocosms were filtered through a 73- μm screen. The filtered seawater, containing the 48-hour old SeaKleen® water, was “restocked” with freshly collected mesoplankton. Following the restocking, we examined the zooplankton and found that the majority of zooplankton was either dead or moribund. Participants at the Environmental Soundness Work Group meeting offered suggestions for future laboratory experiment with SeaKleen®.

In the fall of 2003, the UW prepared a preliminary proposal for conducting a shipboard experiment with SeaKleen®. Discussions have occurred with United States Shipping LLC about using the ITB *Groton* for a shipboard demonstration on the West Coast. The UW will prepare a proposal for a demonstration trial using SeaKleen®. Comments and recommendations about a shipboard demonstration were received at the meeting and are expected in the future from the Environmental Soundness Work Group, Scott Smith (Department of Fish and Wildlife), and Randy Marshall (Department of Ecology).